

U.S. Patent Application Serial No. 10/089,104  
Response dated January 22, 2004  
Reply to OA of August 25, 2003

### REMARKS

Claims 1-13 are pending in this application. Claims 1-10 have been rejected. Amendment has been made to the specification and claim 1 herein. New claims 11-13 have been added.

The specification has been amended to correct minor grammatical and typographical errors. Support for the recitation, on page 14 of the specification, of "crosslinking temperature", and for the recitation of "15%" on page 4 of the specification, can be found in the original Japanese specification of the International Application, and can be clearly deduced from the present specification. No new matter has been added.

Claim 1 has been amended to require 10 to 45 % by weight of the saturated 1,3-butadiene units. Support for this amendment appears throughout the specification and claims as originally filed. New claims 11-13 find support in the specification at page 6, lines 13-18 (claim 11) and page 18, Table 1, and Examples 1-8 (claims 12 and 13). No new matter has been added.

In view of amended claim 1, the newly submitted claims, and the remarks set forth below, further and favorable consideration, is respectfully requested.

#### **I. 102 REJECTION:**

*At page 2, paragraph 2, of the Office Action, claims 1, 4-5, and 7-8, have been rejected as anticipated by Oyama et al. (U.S. Patent No. 4,643,038).*

The Examiner states that Oyama et al. teach an acrylonitrile/butadiene/butyl acrylate copolymer. The Examiner points to Table 1, polymer G.

Anticipation under 35 USC § 102, requires that a single prior art reference teach each and every element of the claimed invention.

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Oyama et al. teach a polymer including 10 to 60 wt% of an unsaturated nitrile units (i.e., acrylonitrile), 0 to 30 wt% of a conjugated diene units (i.e., 1,3 butadiene), and 10 to 90 wt% of ethylenically unsaturated monomer units other than unsaturated nitrile units (i.e., butyl acrylate) and/or hydrogenated conjugated diene units (col. 1, lines 31-60).

Claim 1 has been amended to require saturated 1, 3-butadiene units in an amount of from 10 to 45 wt%. Claims 2-13 are directly or indirectly dependent on claim 1.

Oyama et al. do not teach or suggest a composition containing saturated butadiene.

In view of the amendment to claim 1 and the foregoing remarks, it is submitted that Oyama et al. do not teach each and every element of the claimed invention, as required for anticipation under 35 USC § 102. Accordingly, the Examiner is respectfully requested to withdraw this rejection.

## II. 103 REJECTION:

*At page 3, paragraph 5 of the Office Action, claims 2-3, 6, and 9-10, have been rejected as unpatentable over Oyama et al.*

The Examiner states that while Oyama et al. do not disclose in the examples copolymers of acrylonitrile/butadiene/butyl acrylate copolymer with the claimed monomer compositions, the skilled artisan would have been motivated to modify Oyama et al. by preparing such copolymers with a wide array of monomer compositions because such polymers would be similarly useful.

Claim 1 has been amended to require saturated 1, 3-butadiene units in an amount of from 10 to 45 wt%. Claims 2-13 are directly or indirectly dependent on claim 1. Oyama et al. do not teach or suggest a polymer containing saturated 1, 3-butadiene units, as required by the present claims.

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The present specification teaches at page 5, lines 4-9, that when the amount of saturated 1, 3-butadiene is too small, the cross-linked product has poor resistance to oils including rancid gasoline (i.e., containing for example, trace amounts of condensed aromatics).

Thus, the skilled artisan would have no motivation to modify the composition of Oyama et al. to include such saturated units because Oyama et al. teach overcoming the problem of insufficient oil resistance by providing a composition which *does not include saturated butadiene*.

In fact, Oyama et al. *require* that component (3) be units derived from ethylenically unsaturated monomer units *other than* units formed by hydrogenating units derived from a conjugated diene (i.e., for example formed by hydrogenating 1, 3- butadiene to form saturated butadiene).

Accordingly, Oyama et al. *teach away* from a composition containing saturated butadiene.

In view of the foregoing, it is submitted that a *prima facie* case of obviousness has not been established. Thus, the Examiner is respectfully requested to withdraw this rejection.

Assuming *arguendo* motivation to modify Oyama, in view of the following, it is submitted that the present claims are unobvious within the meaning of 35 USC § 103, in view of Oyama.

It is the present inventor's who surprisingly discovered that a hydrogenated acrylonitrile-butadiene copolymer rubber crosslinked to produce a rubber product, results in a crosslinked rubber product that exhibits a reduced tendency to harden and does not exhibit a volume change even when it is placed in contact with oils containing residual condensed aromatics. Further, it was surprisingly discovered that the crosslinked rubber product produced, maintains good resistance to rancid gasoline.

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The above-mentioned improved oil resistance is obtained with the nitrile group-containing highly saturated copolymer rubber of the present invention, which has a composition satisfying the following requirements:

- (a) Content of 1,3-butadiene units: 0 to 20% by weight,
- (b) Content of saturated 1,3-butadiene units: 10 to 45% by weight,
- (c) Content of  $\alpha,\beta$ -ethylenically unsaturated nitrile monomer units: 40 to 50% by weight,
- (d) Content of other monomer units: 10 to 35% by weight and at least 8T by mol, and

The sum of 1,3-butadiene units (a) and saturated 1,3-butadiene units (b): 20 to 50% by weight.

Oyama et al. disclose a copolymer rubber comprising (a) 10-60% by weight, preferably 20 to 50% by weight, of unsaturated nitrile units, (2) 0-30% by weight, preferably 0-20% by weight, of conjugated diene units, and (3) 35-90% by weight, particularly 40-90% by weight, of ethylenically unsaturated monomer units other than unsaturated nitrile units, and/or hydrogenated conjugated diene units (column 1, lines 31-60). Oyama et al. is concerned with producing products that exhibit and maintain adhesion strength, i.e. a belt.

Oyama et al. do not disclose copolymer rubbers having a composition satisfying the above-noted requirements, as required by the present claims. Oyama et al. suggest nothing about the improved oil resistance including a greatly reduced tendency of hardening, a greatly reduced volume change upon immersion in oil, and good resistance to rancid gasoline.

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Please see the experimental results set forth in the attached Declaration under 37 CFR 1.132.

As can be seen from Declaration, the copolymer rubbers (including "copolymer rubber G" cited by the Examiner) specifically disclosed in the working examples of Oyama et al., result in crosslinked rubber products which are inferior to those made from the copolymer rubber of the present invention in at least one of the above-mentioned beneficial oil-resistant properties, namely, a greatly reduced tendency of hardening, a greatly reduced volume change at immersion in oil, and good resistance to rancid gasoline.

In view of the amendment to claim 1, the newly submitted claims, the Declaration submitted herewith, and the remarks set forth above, it is submitted that nothing in Oyama et al. renders the claimed invention obvious within the meaning of 35 USC § 103. Accordingly, the Examiner is respectfully requested to withdraw this rejection.

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If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicants undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP



Susanne M. Hopkins  
Attorney for Applicants  
Reg. No. 33,247

SMH/plb  
Atty. Docket No. 020520  
Suite 1000  
1725 K Street, N.W.  
Washington, D.C. 20006  
(202) 659-2930



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PATENT TRADEMARK OFFICE

Enclosures: Declaration under 37 CFR 1.132

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